

## Remarks

The check attached to the accompanying letter, in the amount of \$295.00, includes \$44.00 for the additional independent claim and \$36.00 for four dependent claims, as well as \$215.00 for the extension of time.

Re the rejections under 35USC112, applicant attaches hereto, adopted as part of the present argument, a copy of an internet printout titled "Quality 101: Surface Finish Measurement Basics" by Alex Tabenkin, a consultant on surface finish/form metrology at Mahr Federal, Inc., Providence, Rhode Island. It will be seen that the measurement of surface irregularities and roughness (or smoothness) could involve more than 100 ways to measure a surface and analyze the results, expressed as parameters. The paper goes on to say:

The most common parameter is Ra, or Arithmetic Average Roughness. It basically reflects the average height of roughness component irregularities from a mean line. Ra provides a simple value for accept/reject decisions. It is a default parameter on a drawing if not otherwise specified, and is available even in the least sophisticated instruments. Ra is not a good discriminator for different types of surfaces as it is incapable of differentiating between "spiky" and "scratched" surfaces having the same Ra. Additional parameters should be specified for this purpose, such as Rp (Maximum Peak Height), Rv (Maximum Valley Depth) and Ry (Maximum Peak-to-Valley Roughness Height).....

Surface finish measurement procedures, general terminology, definitions of most parameters and filtering information can be found in American Standard ASME B46 1 – 2002, Surface Texture, and in International Standards, IOS 4287 and ISO 4288.

Readily available commercial instruments will provide readouts in Ra, which are recognized by persons of ordinary skill in the art and standard throughout industry. Applicants have abundantly described how an electrolytic microarc oxidation process of bonding the ceramic layer to the metal substrate can be used to make a honing surface having the described range of smoothness/roughness. There can be no question of enablement when the measurement of the surface characteristics is understood.

Applicants have discarded the phrase "characterized by" and now use "having" to introduce the surface finish measurement in terms of Ra. It will be seen from the internet article referred to above that Ra, being an arithmetic average, might not be considered strictly a characteristic of the surface itself, but is rather a manifestation of

the way the instrument measures the surface, considering several effects – see the diagram on page 3 of the article, where the profiles of the surfaces have the same Ra although they appear to be essentially opposite or reverse. It is submitted that the rejections on both the first and second paragraphs of Section 112 are moot.

The initial rejection under 35USC103 combines Campione et al and Meyer, asserting that it would have been obvious to one skilled in the art to combine the features identified by Examiner, allegedly to obtain applicants' invention. Campione et al's concept is to provide a guide plate/holder for a sharpening stone. The sharpening stone is conventional – see column 3, line 59 et seq. No mention is made of a coating of any kind, either in the passage cited by Examiner or anywhere else in the text. Campione's aluminum guide plate, in Examiner's view, corresponds to applicants' "metal body" even though it is completely separate from the stone. Meyer is cited for his teaching about grain size, and Examiner says that it would have been obvious to use Meyer's teachings to choose a grain size which would yield applicants' smoothness characteristics. But applicant says nothing about grains to be included in the honing surface. See the Background of the Invention, particularly paragraphs 0002 and 0004, reviewing the deficiencies of high-pressure compaction of ceramic slurries or powders with binding material, and of solid ceramic materials, even as relatively coarse embedded grain. Applicants' invention is a hard ceramic coating on a metal substrate, which avoids the problems of monolithic ceramic pieces and, for honing, of embedded particles. Meyer's layer 14 is not a ceramic coating as required by applicant's claims, and no combination of his teachings with those of Campione could lead to applicants' invention. Newly submitted claims 26-30 also recite the invention in terms not apparent or inferrable from Campione and Meyer. Please note again applicant's paragraph 2026 – grit is not mentioned in the definition of honing, while a grit size range is recited in the definition of abrading.

The first part of the amendment to claim 1 above is intended to emphasize that the coating is a tangible part of the article. A coating is permanently fixed to and adheres to the underlying body, while Campione's device is "easy to assemble and disassemble" (col. 2, line 56 and elsewhere throughout) – the sharpener and the body are readily separable. Examiner does not meet her burden of showing obviousness by reviewing the law about product-by-process claims, while disregarding the requirement in applicants' claims for the presence of a ceramic coating. In any event, claim 1 has been revised to emphasize that the ceramic coating is a tangible, structural limitation of the claim. That tangible limitation is missing from Examiner's combination; there is no suggestion in the references that would lead one to a ceramic coating, and the rejections in Examiner's paragraph 13 should be withdrawn.

In paragraph 14, the Examiner adds the Cozzini reference to Campione and Meyer for a rejection of five claims. The Cozzini reference is said to contribute the dependent

claims' limitations, while the Campione and Meyer references are applied in the same manner as in the paragraph 13 rejections. But note that Cozzini's "variety of hardened materials" cited by Examiner do not include ceramic, much less a ceramic coating. This contrived combination still lacks a ceramic coating; Cozzini does not supply the missing ingredient. It is also important to note, with respect to the various shapes, profiles and contours in the dependent claims, that it is a particular virtue of the electrolytic microarc oxidation process of bonding the ceramic layer to the metal substrate that it can create the ceramic coating on various contours, shapes and profiles as described particularly with respect to Figures 6a, 6b, and 6c. Such options are not readily available to others in the art who are working with conventional materials and fabrication processes.

Also, in paragraph 15, five more dependent claims are rejected on the same combination of Campione and Meyer, this time adding Cohen, which is cited for his ceramic rods in a triangular configuration and having rounded edges. But again, the feature of a ceramic coating is missing, there is no motivation provided to apply a ceramic coating to a metal body as required by applicants' claims. Note that Cohen's device, like Campione's is designed to permit easy disassembly so the rods can be rotated (col. 4, lines 39-54). The honing surface is not permanently fixed to the "body" as in applicant's device. This combination does not add up to applicants' invention, nor can it reasonably be inferred therefrom.

Paragraph 16 uses all four references to apply against claims 1-3, 5-11, 18, and 23-25, the Examiner purporting to have assembled in the four references all the limitations of all the various combinations recited in the claims. But, again, the important limitation of a ceramic coating is not present among any of the items collected in the recitations for any set of the claims treated, nor is there any motivation apparent from the references to combine them in a way which achieves applicants' invention – that is, a product having a ceramic coating for a honing surface.

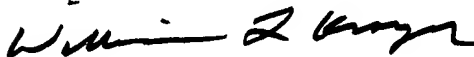
Referring now to the Examiner's "Response to Arguments" beginning on page 10, it again should be observed that the Examiner (paragraph 18) is dismissing applicants' ceramic coating by invoking the principles of product-by process claims, without having found a ceramic coating applied by any process in the prior art. In order to fulfill the burden of showing unpatentability, it is still necessary for Examiner to show a honing surface coated with a ceramic, or, to use the newly amended language, a "ceramic coating." This comment is appropriate also for paragraphs 20 and 22.

Re paragraph 21, applicants' attorney can see the potential for confusion in our last response. But, to the extent Examiner relies on Cohen's ceramic for the abrading surface, it is unclear how the ceramic is combined with the Campione disclosure. In any event, there is no ceramic coating in either Campione or Cohen.

The above amendment to claim 1 clarifies that the ceramic coating is indeed a tangible, structural limitation. No such element is seen in the references, nor can it be inferred from any suggestions in the references. The rejections should be withdrawn. Newly presented claims 26-30 all include a ceramic coating as a limitation, and in claim 30, recite a thickness limitation for the ceramic coating.

The present status of all claims is appended hereto.

Respectfully submitted,




William L. Kraye

Certification under 37CFR1.10  
(Express Mail)

Express Mail Mailing Number: **ER 490685069 US**  
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I hereby certify that the application/correspondence attached hereto is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37CFR1.10 on the date indicated above and is addressed to Mail Stop: Non-fee Amendment, Commissioner for Patents, PO Box 1450, Alexandria VA 22313-1450.



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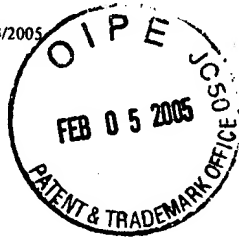
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EXAMINER

NORDMEYER, PATRICIA L

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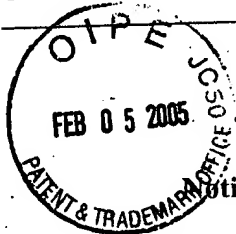
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Office of Non-Compliant Amendment (37 CFR 1.121)

The amendment document filed on 11-15-04 is considered non-compliant because it has failed to meet the requirements of 37 CFR 1.121. In order for the amendment document to be compliant, correction of the following item(s) is required. **Only the corrected section of the non-compliant amendment document must be resubmitted (in its entirety), e.g., the entire "Amendments to the claims" section of applicant's amendment document must be re-submitted. 37 CFR 1.121(h).**

THE FOLLOWING CHECKED (X) ITEM(S) CAUSE THE AMENDMENT DOCUMENT TO BE NON-COMPLIANT:

- ☐ 1. Amendments to the specification:
- ☐ A. Amended paragraph(s) do not include markings.
  - ☐ B. New paragraph(s) should not be underlined.
  - ☐ C. Other \_\_\_\_\_
- ☐ 2. Abstract:
- ☐ A. Not presented on a separate sheet. 37 CFR 1.72.
  - ☐ B. Other \_\_\_\_\_
- ☐ 3. Amendments to the drawings: \_\_\_\_\_
- ☒ 4. Amendments to the claims:
- ☒ A. A complete listing of all of the claims is not present.
  - ☐ B. The listing of claims does not include the text of all pending claims (including withdrawn claims)
  - ☐ C. Each claim has not been provided with the proper status identifier, and as such, the individual status of each claim cannot be identified. Note: the status of every claim must be indicated after its claim number by using one of the following 7 status identifiers: (Original), (Currently amended), (Canceled), (Withdrawn), (Previously presented), (New) and (Not entered).
  - ☐ D. The claims of this amendment paper have not been presented in ascending numerical order.
  - ☒ E. Other: Begin each section of an amendment on a separate sheet: Specification; Claims; Drawing and Remarks

For further explanation of the amendment format required by 37 CFR 1.121, see MPEP Sec. 714 and the USPTO website at <http://www.uspto.gov/web/offices/pac/dapp/opla/preognotice/officflyer.pdf>.

If the non-compliant amendment is a **PRELIMINARY AMENDMENT**, applicant is given **ONE MONTH** from the mail date of this letter to supply the corrected section which complies with 37 CFR 1.121. Failure to comply with 37 CFR 1.121 will result in non-entry of the preliminary amendment and examination on the merits will commence without consideration of the proposed changes in the preliminary amendment(s). This notice is not an action under 35 U.S.C. 132, and this **ONE MONTH** time limit is not extendable.

If the non-compliant amendment is a reply to a **NON-FINAL OFFICE ACTION** (including a submission for an RCE), and since the amendment appears to be a *bona fide* attempt to be a reply (37 CFR 1.135(c)), applicant is given a **TIME PERIOD** of **ONE MONTH** from the mailing of this notice within which to re-submit the corrected section which complies with 37 CFR 1.121 in order to avoid abandonment. **EXTENSIONS OF THIS TIME PERIOD ARE AVAILABLE UNDER 37 CFR 1.136(a).**

If the amendment is a reply to a **FINAL REJECTION**, this form may be an attachment to an Advisory Action. **The period for response to a final rejection continues to run from the date set in the final rejection**, and is not affected by the non-compliant status of the amendment.

*Brenda Massey*  
Legal Instruments Examiner (LIE)

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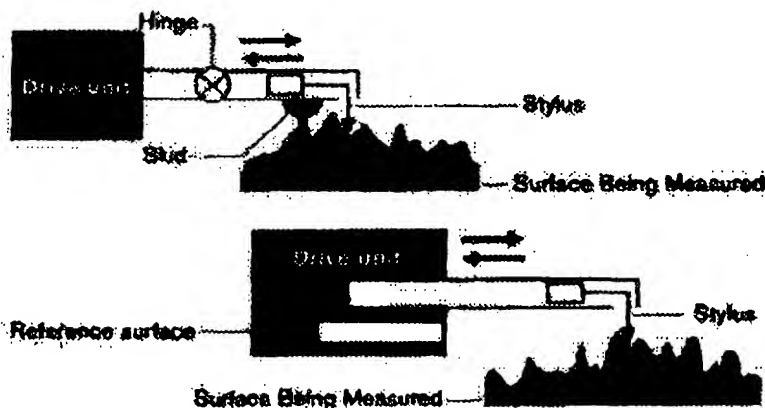
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## Quality 101: Surface Finish Measurement Basics

By Material Provided by Alex Tabenkin,  
consultant on surface finish/form metrology  
at Mahr Federal, Inc. (Providence, RI)

Posted on: 09/01/2004

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In skidded gages, the sensitive, diamond-tipped stylus is contained within a probe, which has a skid that rests on the workpiece. Skidded gages (upper) measure roughness only. Skidless gages (lower) use an internal precision surface as a reference. This enables skidless gages to be used for measurements of waviness and form, in



**addition to roughness. Source: Mahr Federal Inc.**

Ever since E.J. Abbot developed the first surface finish tester at the University of Michigan in the 1940s, industry has been aware that roughness is an important characteristic of machined surfaces.

The growing influence of surface finish can be traced to dramatic changes in manufacturing specifications and drastic tightening of dimensional tolerances over the past few decades. As a result of these changes, the proportion of the tolerance range, which is taken up by surface irregularities, has increased from roughly 15% in the 1940s to nearly 50% in some cases today.

Surface geometry is measured for two principle reasons: to try to predict the performance of the machined parts, such as engine pistons and fuel injection parts, and to try to control the manufacturing process.

A surface consists of three basic components: form, waviness and roughness. On a turned part, form is the result of errors in the way the lathe produces a part, commonly known as straightness errors, and waviness is a result of various vibrations, both in the machine tool and from outside sources. Roughness, on the other hand, is the result of feed-rate tool geometry, tool condition, and variations in material and hardness.

There are two general types of

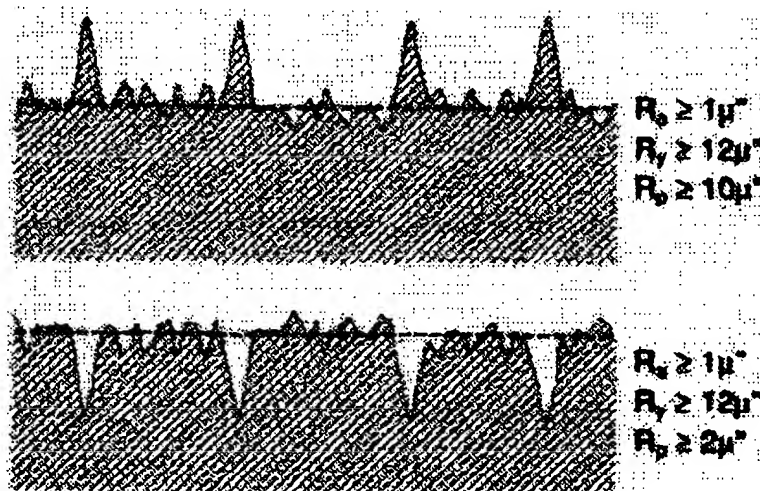
surface-finish measuring systems: "skidded," measuring roughness only, and "skidless," evaluating form, waviness and roughness. In skidded gages, the sensitive, diamond-tipped stylus is contained within a probe, which has a skid that rests on the workpiece. Thus, skidded gages use



the workpiece itself as the reference surface.

Skidless gages use an internal precision surface as a reference. This enables skidless gages to be used for measurements of waviness and form, in addition to roughness.

Because the three basic forms of surface geometry are caused by different factors and tend to have different relationships to the performance of the part, it is common to separate them during analysis. This separation is achieved by the selection of filter or cutoff settings that allow the operator to select the degree of filtering that will be applied to the measured profile.



**Here, two very different surfaces have the same  $R_a$ . Source: Mahr Federal Inc.**

The irregularities of the machined surface consist of high and low spots created by the tool bit or by a grinding wheel. These peaks and valleys can be measured and used to define the conditions and sometimes the performance of the surface. There are more than 100 ways to measure a surface and analyze the results, expressed as parameters, but for most cases, only a few are specified. Each of the parameters has its own advantages and limitations. Often one parameter is incapable of

defining a surface adequately. Therefore, a complete definition of a surface often involves two or more parameters, and in some cases, the relationship or ratio of one parameter to another.



The most common parameter is Ra, or Arithmetic Average Roughness. It basically reflects the average height of roughness component irregularities from a mean line. Ra provides a simple value for accept/reject decisions. It is a default parameter on a drawing if not otherwise specified, and is available even in the least sophisticated instruments. Ra is not a good discriminator for different types of surfaces as it is incapable of differentiating between "spiky" and "scratched" surfaces having the same Ra. Additional parameters should be specified for this purpose, such as Rp (Maximum Peak Height), Rv (Maximum Valley Depth) and Ry (Maximum Peak-to-Valley Roughness Height).

In Europe, the more common parameter for roughness is Rz, or Mean Roughness Depth. It is the average distance between the highest peak and the deepest valley in five sampling lengths, or cutoffs. Rz is more sensitive than Ra to the changes in surface finish because maximum profile heights, and not the averages, are being examined. There is no firm conversion between Ra and Rz parameters, as the actual ratio depends upon the shape of profile, but the approximate ratio of  $Rz = 4 - 7 Ra$  could be used.



Surface finish measurement procedures, general terminology, definitions of most parameters and filtering information can be found in American Standard ASME B46.1 - 2002, Surface Texture, and in International Standards, ISO 4287 and ISO 4288.